

Pre-Calculus
Unit 3 Rational Functions Review

Name Answer Key
Hour _____

For problems #1-3, solve the rational equations for the unknown variable. Be sure to check for extraneous solutions.

1. $\frac{10}{z} = -3z + 31$

$10 = -3z^2 + 31z$

~~$3z^2 - 31z + 10 = 0$~~

$\frac{2(x-2)}{(x-2)(x+5)} + \frac{6(x+5)}{(x+5)(x^2+3x-10)} = \frac{18}{(x+5)(x-2)}$

$2(x-2) + 6(x+5) = 18$

$2x - 4 + 6x + 30 = 18$

$8x + 26 = 18$

$(3z^2 - z)(-30z + 10) = 0$

$z = 10, \frac{1}{3}$

$z(3z-1) - 10(3z-1)$

$(z-10) = 0 \quad 3z-1 = 0$

$8x = -8$

$x = -1$

3. $\frac{x+4}{x-3} = \frac{x-6}{x+8}$

$(x+4)(x+8) = (x-6)(x-3)$

$x^2 + 12x + 32 = x^2 - 9x + 18$

$12x + 32 = -9x + 18$

$21x = -14$

$x = \frac{-14}{21} = \boxed{\frac{-2}{3}}$

4. Find the domain of the function.

$f(x) = \frac{x-5}{x-2}$

$\mathbb{R}; x \neq 2$

5. Which values, if any, cause $f(x) = \frac{4x+7}{x^2+6x+8}$ to be undefined?
 $(x+4)(x+2)$

$x \neq -4, -2$

6. Determine the horizontal and vertical asymptotes, if any, of the function $f(x) = \frac{2x^2+9}{5x^2+2}$.

Show all work!

HA: $\frac{2x^2}{5x^2} = \text{same degree}$

$y = \frac{2}{5}$

VA

$5x^2 + 2 = 0$

$5x^2 = -2$

$x^2 = \frac{-2}{5}$

$\sqrt{\frac{-2}{5}}$

imaginary
 \therefore no VA

7. Sketch the graph of the rational function. State the x- and y-intercepts, vertical and horizontal asymptotes and holes of the graph. If there aren't any for this function, write *none*.

$$f(x) = \frac{x+7}{x^2 - 7x + 12} = \frac{x+7}{(x-3)(x-4)}$$

Vertical Asymptote(s): $x=3, 4$

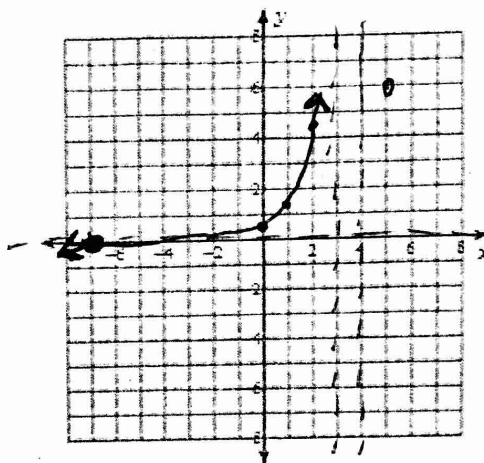
Hole(s): *None*

Horizontal Asymptote: $y=0$

x-intercept(s): $x+7=0 \quad x=-7$

y-intercept:

$$\frac{0+7}{(0-3)(0-4)} = \frac{7}{12}$$



x	y
1	$\frac{8}{(-2)(-3)} = \frac{8}{6} = \frac{4}{3}$
2	$\frac{9}{(-1)(-2)} = \frac{9}{2}$
5	$\frac{12}{(2)(1)} = 6$

8. Write a rational function that would have a vertical asymptote at $x=3$ and a horizontal asymptote at $y=\frac{1}{2}$.

$$\frac{x+5}{2(x-3)}$$

The senior class is planning the Prom. The band costs \$600, the rental of a hotel ballroom is \$300, and the cost of beverages is \$100. The hotel will charge an additional \$20 per person for food. Based on a lottery, ten couples will be allowed to attend the Prom at no charge.

- a. Write an equation that expresses the cost per paying student (y) in terms of the total number of students (x).

$$\frac{1000 + 20x}{x-20}$$

- b. If each paying guest paid \$30.00, how many guests attended Prom?

$$\frac{1000 + 20x}{x-20} = 30$$

$$10x = 1060$$

$$x = \underline{106 \text{ people}}$$

$$1000 + 20x = 30(x-20)$$

$$1000 + 20x = 30x - 600$$